

We Claim:

1. A system for stimulating circulatory activity in a targeted body region of an individual comprising

an ultrasound applicator adapted to be coupled to an electric signal generating machine to apply ultrasound energy to affect an increase in blood perfusion in the targeted body region, and

an angiogenic agent administered to the individual to promote angiogenesis in the targeted body region before, during, or after application of the ultrasound energy.

2. A system according to claim 1

wherein the angiogenic agent includes monocyte chemoattractant protein-1.

3. A system according to claim 1

wherein the angiogenic agent includes granulocyte-macrophage colony-stimulating factor.

4. A system according to claim 1

wherein the ultrasound applicator is sized to be placed in acoustic contact with an individual to transcutaneously apply ultrasound energy to the thoracic cavity.

5. A system according to claim 1

wherein the ultrasound applicator generates ultrasound energy at a prescribed fundamental therapeutic frequency laying within a range of fundamental therapeutic frequencies not exceeding about 500 kHz.

6. A system according to claim 5

wherein the ultrasound applicator comprises a transducer and an ultrasonic coupling region adapted, in use, to contact skin and having an effective diameter (D) to transcutaneously conduct ultrasound energy at the prescribed fundamental therapeutic frequency by the transducer, wherein the transducer has an aperture size (AP) not greater than

about 5 wavelengths, wherein AP is expressed as $AP = D/WL$, where WL is the wavelength of the fundamental frequency.

7. A system according to claim 5

wherein the range of fundamental therapeutic frequencies is between about 20 kHz and about 100kHz.

8. A system according to claim 7

wherein the prescribed fundamental therapeutic frequency is about 27 kHz.

9. A system according to claim 1

5 wherein the ultrasound applicator is sized to provide an intensity not exceeding 3 watts/cm² at a maximum total power output of no greater than 150 watts operating within a range of prescribed fundamental therapeutic frequencies not greater than 500 kHz.

10. A system according to claim 9

wherein the range of fundamental therapeutic frequencies is between about 20 kHz and about 100kHz.

11. A system according to claim 10

wherein the prescribed fundamental therapeutic frequency is about 27 kHz.

12. A system according to claim 1

further including an assembly to stabilize placement of the ultrasound applicator during conduction of ultrasound energy.

13. A method for stimulating circulatory activity in a targeted body region of an individual comprising the steps of

5 applying ultrasound energy to the targeted body region to affect an increase in blood perfusion in the targeted body region, and

administering an angiogenic agent to the individual to promote angiogenesis in the targeted body region before, during, or after application of the
10 ultrasound energy.

14. A method according to claim 13

wherein the angiogenic agent includes monocyte chemoattractant protein-1.

15. A method according to claim 13

wherein the angiogenic agent includes granulocyte-macrophage colony-stimulating factor.

16. A method according to claim 13

wherein the ultrasound energy is applied to the thoracic cavity.

17. A method according to claim 13

wherein the ultrasound energy is transcutaneously applied to the heart.

18. A system for achieving regional systemic therapy in an individual comprising

an agent administered to the individual which results in a decrease in blood perfusion in the individual, and

an ultrasound applicator adapted to be coupled to an electrical signal generating machine to apply ultrasound energy to affect an increase in blood perfusion in a localized body region before, during or after administration of the agent to the individual.

19. A system according to claim 18

wherein the ultrasound applicator is sized to be placed in acoustic contact with an individual to transcutaneously apply ultrasound energy to the heart.

20. A system according to claim 18

wherein the ultrasound applicator generates ultrasound energy at a prescribed fundamental therapeutic frequency laying within a range of fundamental therapeutic frequencies not exceeding about 500 kHz.

21. A system according to claim 20

wherein the ultrasound applicator comprises a transducer and an ultrasonic coupling region adapted, in use, to contact skin and having an effective diameter (D) to transcutaneously conduct ultrasound energy at the prescribed

fundamental therapeutic frequency by the transducer, wherein the transducer has an aperture size (AP) not greater than about 5 wavelengths, wherein AP is expressed as $AP = D/WL$, where WL is the wavelength of the fundamental frequency.

22. A system according to claim 20

wherein the range of fundamental therapeutic frequencies is between about 20 kHz and about 100kHz.

23. A system according to claim 22

wherein the prescribed fundamental therapeutic frequency is about 27 kHz.

24. A system according to claim 18

wherein the ultrasound applicator is sized to provide an intensity not exceeding 3 watts/cm² at a maximum total power output of no greater than 150 watts operating within a range of prescribed fundamental therapeutic frequencies not greater than 500 kHz.

25. A system according to claim 24

wherein the range of fundamental therapeutic frequencies is between about 20 kHz and about 100kHz.

26. A system according to claim 25

wherein the prescribed fundamental therapeutic frequency is about 27 kHz.

27. A system according to claim 18

further including an assembly to stabilize placement of the ultrasound applicator during conduction of ultrasound energy.

28. A method for achieving regional systemic

therapy in an individual comprising the steps of administering an agent which results in a decrease in blood perfusion in the individual, and

applying ultrasound energy to affect an increase

in blood perfusion in a localized body region before, during or after administration of the agent to the individual.

29. A method according to claim 28

wherein the ultrasound energy is applied to the

heart.

30. A method according to claim 29
wherein the ultrasound energy is transcutaneously
applied to the heart.

31. A system for achieving regional systemic
therapy in an individual comprising

an agent administered to the individual, and
an ultrasound applicator adapted to be coupled
5 to an electrical signal generating machine to apply
ultrasound energy to affect an increase in blood perfusion
or uptake of the agent in a localized body region before,
during, or after administration of the agent to the
individual.

32. A system according to claim 31
wherein the agent is a chemotherapy drug.

33. A system according to claim 31
wherein the ultrasound applicator generates
ultrasound energy at a prescribed fundamental therapeutic
frequency laying within a range of fundamental therapeutic
5 frequencies not exceeding about 500 kHz.

34. A system according to claim 33
wherein the ultrasound applicator comprises a
transducer and an ultrasonic coupling region adapted, in
use, to contact skin and having an effective diameter (D) to
5 transcutaneously conduct ultrasound energy at the prescribed
fundamental therapeutic frequency by the transducer, wherein
the transducer has an aperture size (AP) not greater than
about 5 wavelengths, wherein AP is expressed as $AP = D/WL$,
where WL is the wavelength of the fundamental frequency.

35. A system according to claim 33
wherein the range of fundamental therapeutic
frequencies is between about 20 kHz and about 100kHz.

36. A system according to claim 35
wherein the prescribed fundamental therapeutic
frequency is about 27 kHz.

37. A system according to claim 33
wherein the ultrasound applicator is sized to
provide an intensity not exceeding 3 watts/cm² at a maximum
total power output of no greater than 150 watts operating
5 within a range of prescribed fundamental therapeutic
frequencies not greater than 500 kHz.

38. A system according to claim 37
wherein the range of fundamental therapeutic
frequencies is between about 20 kHz and about 100kHz.

39. A system according to claim 38
wherein the prescribed fundamental therapeutic
frequency is about 27 kHz.

40. A system according to claim 28
further including an assembly to stabilize
placement of the ultrasound applicator during conduction of
ultrasound energy.

41. A method for achieving regional systemic
therapy in an individual comprising the steps of
administering an agent to the individual, and
applying ultrasound energy to affect an increase
5 in blood perfusion or uptake of the agent in a localized
body region before, during or after administration of the
agent to the individual.

42. A method according to claim 41
wherein the agent is a chemotherapy drug.